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ABSTRACT

In 1969, the State of Maranhao in north-east Brazil instituted a system of educational television designed to provide instruction for the last four years of basic education. It affects some 13,000 students living in the poor outer suburbs of the capital of the State. The experiment is today faced with the vitally important problem of expansion. The first chapter of this report provides a brief summary of the economic and educational situation, and describes the education system in Maranhao and the Maranhese Foundation for Educational Television (MFTVE). The second chapter deals with the costs of the system from various points of view, and the third is a tentative appraisal of its educational effectiveness. Concluding comments based both on empirical data and on more informal observations include suggestions for priorities on which MFTVE should concentrate in the immediate future. (VT)

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ECONOMIC ANALYSIS OF EDUCATIONAL TELEVISION IN MARANHAO, BRAZIL

by

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CONTENTS

		page
INTRODUCTION		5
A.	General problem of the cost-effectiveness study of an educational technology	5
B.	The case of F.M.T.V.E.	8
CHAPTER I.	The economic and educational situation in Brazil and in the State of Maranhao	10
	I. General situation in Brazil	10
	I.1 The economic context	10
	I.2 General organization of education	11
	II. Specific features of education in Maranhao	14
	II.1 The economic context	14
	II.2 Features of the education system	16
	II.3 Organization of F.M.T.V.E.	18
CHAPTER II.	Costs and financing of F.M.T.V.E.	25
	II.1 Past and future expenditures	25
	- System expenditures from 1969 to 1976	26
	- Projected system expenditures from 1977 to 1985	26
	- Costs and enrolment figures from 1969 to 1985	31
	II.2 Calculation of total and average costs	31
	- Cost functions	31
	- Trends in average costs	36
	II.3 Financing of F.M.T.V.E.	36
CHAPTER III.	Analysis of the effectiveness of the system	41
	III.1 Methodological comments	41
	III.2 The educational effectiveness of the system	43
	III.3 Other effects	45
GENERAL CONCLUSION		47

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INTRODUCTION

The State of Maranhao, in north-east Brazil, instituted in 1969 a system of educational television designed to provide instruction for the last four years of basic education; the system thus caters for children who are in theory aged from 11 to 14, and corresponds to what is in many countries the first level of secondary education.

The scale of this experiment has hitherto been relatively modest. It affects some 13,000 pupils living in the poor outer suburbs of the capital of the State, São Luis. The experiment is today faced with a problem of vital importance, that of expansion. However, before discussing this particular aspect, let us look at some general considerations.

A. General problem of the cost-effectiveness study of an educational technology

For an economist, the major characteristic of an education system largely based on the medium of television is that it involves higher fixed costs than do traditional technologies, and that as a result marginal costs fall sharply, which is an argument in favour of rapid expansion.

Is the additional fixed cost offset by a gain elsewhere? Generally speaking, the experts who draw up such projects emphasize two possible kinds of "benefits". The first is a reduction in the cost of the labour factor. The former teacher is no longer the sole medium between knowledge and the pupil; he even plays a secondary rôle in relation to the television receiving set. Thus in theory the level of qualification required by his new function is lower than before, and the cost of his services should also be lower.

The second benefit anticipated is educational. The conjunction of the two media (teacher and television), frequently, accompanied by a third in the form of written documents which have been devised as an integral part of the programme, is considered likely to yield significantly better educational results.

Both these benefits are looked for, but are they achieved? The answer to this question is of obvious strategic interest. It conditions the development of current experiments, and is a crucially important consideration in the shaping of future educational policy.

If we look back at the recent past, we see that enthusiasm for the new media was very great in the 1960's, whereas it is tending to mark time in the mid-1970's. It is significant to note that in the 1960's, three types of specialists (we might say three lobbies) were mainly involved in the conception and launching of these educational experiments: educationalists interested in the possible advantages of the new media, representatives of the producers of equipment, interested in the sale of their new products, and politicians, with responsibility for the final decision. The present period seems rather that of the economists, since the decision-makers have a vague feeling that the cost-effectiveness balance sheet of these experiments is not as positive as was expected, and are asking for more precise figures, based not on forecasts but on facts.

The first reason for this questioning is the virtually universal failure to achieve the first objective, an absolute reduction in the cost of the labour factor. Where it has been introduced television has made no significant change in the pupil/teacher ratio. Nor has it made it possible to pay the new "teachers" at rates lower than those of their predecessors or of their counterparts working without television at the same level. As a rule, in fact - doubtless for valid reasons - the opposite has occurred, so that instead of falling, the costs of these systems have actually gone up.

With regard to educational performance, the situation is more complex. In the first place, there has not yet been a sufficiently sophisticated educational evaluation to keep all the variables constant, even supposing that all the variables affecting an educational process have been fully identified. Usually only partial indicators are available, without any certainty that the variations in them are due to the television medium; in some cases one can even be sure of the contrary, as for instance in Ivory Coast, where the institution of automatic promotion from one grade to another means that one cannot attribute the abolition of repeating to television, even if the introduction of television coincided with it.

In the second place, the objective of maximizing educational results is understandable in a world where qualifications are rare, but the need for it is felt very much less in a world where education is no longer a rare possession. Here ideology has closely followed the development of production forces. In the 1950's and 1960's, a period when there was a strong demand for skilled labour, ideology made education into a high-quality possession, as valuable and estimable as life itself, and coming to be regarded, like life as its own ultimate objective: for it was necessary to justify the growing transfer of resources to education.

With the period of abundance the demand for skilled labour ceases to be so pressing, but the justifications for education as an end in itself also disappear. Today most countries are less and less inclined to agree to all-out sacrifices on behalf of education.

Other needs now appear to have greater priority, such as public health, the welfare of the elderly, the quality of life in towns, pollution control and the protection of the environment.

The world average for the allocation of resources to education is approximately 5% of GNP, with a minimum of 3% and a maximum of 7%. There is little likelihood of any great increase in this average. It is conceivable that there may be a slight reduction in the variance, and in particular there are grounds for hoping that Brazil, which is nearer the minimum than the average, will draw closer to the average.

The challenge thus facing those responsible for education is that of producing better results with resources in which little future variation can be expected.

Technologies based on media which are produced industrially, that is to say which have a diminishing cost structure, are <u>a priori</u> a possible solution. Among goods and services taken as a whole, education is a curious exception in respect of the technology of its production: the proportion represented by labour is overwhelming, that by capital negligible. Is the law that capital costs tend to diminish one that will never operate in the education sector? Whatever the case may be, two factors may explain why to date education has not been affected by industrial-type technologies.

1. The production cost of education is not a charge on those who ultimately create the demand, namely employers, but is usually shared between taxpayers and families. The former have been victims of the ideology that education is a "superior" possession, and the latter of the ideology that human capital must be an economic proposition, whatever its cost.

2. The teaching profession and educationalists, tend to set a very high value on the human relationship in education (and to protect their own employment). They have a negative attitude to the introduction of the "machine". It is interesting to note that the same type of argument was used in the case of medicine. It was argued that only the family doctor knew the patient and could thus treat him effectively. This ideology, which was used as a smoke screen by the defenders of traditional, liberal medicine, did not hold out against the incomparable effectiveness of diagnoses established by means of laboratory tests or using sophisticated equipment. In the meantime, the requirements of the quality of life, a concept which is at odds with the full-time availability of the family doctor, had incidentally made the need to have personal knowledge of the patient a thing of the past.

If this is the kind of reasoning responsible for the anachronistic maintenance of an educational technology based on human labour, can we predict that this technology will inevitably disappear? The main difficulty is the extent to which the individual teacher is ultimately irreplaceable. We are far from thinking that the teacher serves no purpose. It is even our view that, setting aside the question of costs, the ideal technology is that of the individual, highly-qualified mentor, if possible a graduate of the Ecole Polytechnique or Harvard University. Divested of its pseudo-axiological connotations, the problem is in fact that of the rational allocation of resources in a world of scarcity and of conflicting needs.

While the demand by families for education remains high, the taxpayers' capacity to finance an increasingly burdensome education system seems to have reached its limit. Though we have yet to embrace the visionary doctrines of Illich, who advocates abolishing present education systems in favour of an individual type of education based on electronic media connecting the individual at will to rationally constituted stores of knowledge, it nevertheless remains highly probable that the decrease in the production cost of electronic systems will mean the replacement, at least in part, of the labour factor in educational technologies. We lean towards the view that this process will initially affect those levels of education at which knowledge has already been built up and individuals are best equipped for working on their own, namely the initial stages of higher education. It should then spread to different levels of secondary education, but it is probable that the younger the child, the less he is able to do without the presence of an adult in an education process.

Over the years it has been noted that there is a gradual lowering of the teacher's social status. The increasing number of women teachers is a good example both of sexual discrimination on the labour market, and of the decline in the social prestige of the profession.

In the long term, this means that those who are best suited for the exercise of this difficult profession will turn their back on it, leaving the field to less qualified people. This dual trend, the lowering of capital costs and the decline in respect for the teaching function, at a time when resources are being stabilized and the concept of education being brought down

to earth, should make evaluators and decision-makers extremely cautious in their judgement of current experiments. Costs should be regarded in part as system development costs. No enterprise determines its long-term policy on cost-benefit figures for a prototype; it spreads research costs over mass production models. The problem, for those who initiate educational experiments, is that they have no control over mass production.

B. The case of F.M.T.V.E. (Maranhese Foundation for Educational Television)

It is in this very general context that we should like the analysis of the experiment taking place in Maranhao to be read and interpreted. This educational television programme, which is not as well-known as it ought to be in other countries, because it did not have the good (or ill) fortune to be carefully tended in its cradle by a concourse of international experts, is certainly one of the most interesting examples of the development of a system using local human resources, with a view to meeting particularly urgent needs by adapting contents to the actual local situation.

To take stock of this experiment has been an enthralling but delicate task. Those in charge of the experiment, under pressure because of the urgency of their work and the need to keep the system functioning from day to day with make-shift resources, did not always have time to set aside the information likely to be of interest to future evaluators.

However, as the experiment progressed and developed, more and more of the data needed to evaluate the system became available. At the present time, the gaps are to be found more in the alternatives to the system which would allow of cost-effectiveness comparisons (a traditional public system, a traditional private system) than in F.M.T.V.E. itself, which is increasingly aware of the need for self-evaluation and self-inspection.

One of the advantages of such an analysis is that useful conclusions can be sought in it for the international community as a whole, and this is in fact Unesco's aim in promoting such studies. The Brazilian context makes it somewhat difficult for this objective to be successfully attained. Very often we came across a cost structure totally at variance with any normal pattern and, in addition, the conversion of costs expressed in the national currency (the cruzeiro) into an international currency (the US dollar) calls for considerable mental acrobatics, since the Brazilian inflation rate is such that almost 20 devaluations were necessary during 1976 alone.

We have tried as far as possible in this study to follow the methodological recommendations made by the expert meetings held on the initiative of Unesco in 1975 (January and June). The principles are moreover fairly close to those of Jamison, Klees and Wells(1), and have already been applied in the study on Ivory Coast educational television.

We considered it worth while for the first chapter to begin with a brief summary of the economic and educational situation, for the benefit of the reader unfamiliar with the Brazilian scene, and then describe the education system in the State of Maranhao and the Maranhese Foundation for Educational Television (F.M.T.V.E.).

(1) Jamison, Klees, Wells (1976) - Cost Analysis for Educational Planning and Evaluation - Agency for International Development, Washington D.C.

The second chapter deals with the costs of the system from various points of view, and the third is a tentative appraisal of its educational effectiveness. The conclusion attempts a general stock-taking based both on precise empirical data and on the authors' personal conclusions.

CHAPTER I

THE ECONOMIC AND EDUCATIONAL SITUATION IN BRAZIL AND THE STATE OF MARANHAO

I. GENERAL SITUATION IN BRAZIL

I.1 The economic context

Over the last three decades the Brazilian economy has seen an average growth rate for GNP of approximately 10%, coming second in the world after Japan, largely owing to the volume of investment by both foreign capital and the public sector.

During this period Brazil, like other developing countries such as Taiwan, South Korea and Mexico, carried out the transition to a modern sophisticated industrial economy and it can now be rightly regarded as one of the most promising examples of future economic power, with a particularly powerful public sector. In addition, it possesses considerable quantities of varied natural resources, some of which have great strategic importance (see Table I.1).

Net transfers of foreign capital are still considered as vital for the solution of short-term and long-term balance of payment difficulties and the financing of the investment on which future growth depends.

Public initiative in the economic field is continually on the increase, offsetting the weight of multinational enterprises and compensating for the weakness of local private initiative. The effort by the State is concentrated both on expenditure on infrastructure, or expenditure of a social nature, and on stimulating investment (by measures guaranteeing demand, and long-term credits). However, the margin of freedom is small, not only because the government is unable to have as much recourse as it would like to foreign suppliers, but also because in its growing economic activities it has to contend with severe international competition. Urgent domestic needs must also be taken into account.

Table I.1: Growth rate of GNP and GNP per capita

Years	GNP(1) in millions of cruzeiros at current rates	In millions of US dollars	Population(2)	GNP per capita in US dollars
1970	205,539	41,776	92,343,000	452
1971	276,293	49,338	94,927,576	519
1972	361,325	58,466	97,585,548	599
1973	477,323	77,236	100,317,900	769

Sources: (1) Estatisticas da Educação Nacional MEC/SG/SEEC, page 22.
(2) Estimated by applying an annual growth rate of 2.8% to the 1970 census.

Against this general background the country has to cope with two very serious problems, the permanent disequilibrium in the balance of payments and the very high rate of inflation (see Table II.1). These problems are caused not only by the fact that current economic policy is not sufficiently effective, but also by the nature and forms of capital, and by an unbalanced economic structure. In addition, the growing dependence of the Brazilian economy on external factors means that decisions of domestic economic policy are in part dictated by multinational firms.

Concluding this brief summary of the economic situation in Brazil, it should be stressed that the level of GNP per capita in dollars, which reached nearly $800 in 1973, should not disguise the fact that the distribution of income is very inequal, and that GNP is largely concentrated in the hands of the richest 10% of the population.

Table I.2: Fluctuations in the cruzeiro in relation to the US dollar

Years	Number of cruzeiros for $1	Year and month 1974	Number of cruzeiros for $1	Year and month 1975	Number of cruzeiros for $1
1969	4.076	July	6.845	April	7.80
1970	4.92	August	6.98	May	7.92
1971	5.60	September	7.09	June	8.02
1972	6.18	October	7.18	July	8.23
1973	6.18	November	7.28	August	8.31
1974 January	6.30	December	7.39	September	8.47
February	6.415	1975 January	7.51		
April	6.515	February	7.58	⋮	
June	6.775	March	7.69	1976 December	11.76

I.2 General organization of education

The organization of education in Brazil is somewhat similar to that in the United States. Brazil is a Federal Republic, comprising twenty-two States, four territories and a Federal District in which is situated the administrative capital, Brasilia.

In theory, the responsibilities for the various levels of education are shared as follows: the communes are responsible for the first four years of basic education, the States for the next four years, plus three or four years of secondary schooling, and the Federal Government is responsible for the universities.

In point of fact there is some overlapping. As the communes generally have great difficulty in fulfilling their responsibilities, the States frequently take them over in part, and sometimes finance universities. The Federal Government often intervenes in the field of competence of the States, and private education, which is not State-aided, is also widespread, particularly from the fifth grade onwards.

The States receive grants from the Federal Government. These grants are directly proportional to the number of inhabitants and to the States' own efforts, and inversely proportional to per capita income. This latter arrangement has important implications inasmuch as differences between States in respect of average per capita income are extremely marked.

The States are not entirely autonomous. They must comply with Federal legislation in the field of education, under which, for example the system of basic education is standardized. This includes four grades of primary education, for 7 to 10 year-olds, designated by the first four ordinal numbers (7 years old = 1st grade, 8 years old = 2nd grade etc.). These are followed by four years, from 5th to 8th grade, which correspond to the first level of secondary education, but which are in fact added on to the four years of primary school, thus constituting a basic education spread over an eight-year period somewhat on the lines of the Swedish, Polish or East German systems. These eight years are in principle compulsory.

This basic course of education is followed by secondary education, corresponding in fact to the second level of French secondary education, to which access is by competitive examination and which also lasts four years.

The way in which this general model is applied varies considerably from one State to another, and it can be said that in all the States where per capita income is below the national average the school network remains at a rudimentary stage, particularly in rural areas - of which in fact the States in the centre and north of the country mainly consist.

The principal feature of these regions is the very high drop-out rate from one grade to the next. This rate is so high, from the first years of primary schooling onwards, that only a minute proportion of pupils go on to secondary education (some 5%).

Another feature of the rural areas, including those in the south, is that they do not succeed in attracting the necessary trained teachers. From 5th grade onwards, the teachers are subject-teachers; they are in principle expected to have a qualification at university level and it is very difficult to keep such teachers in rural areas, since in a country the size of Brazil this means being almost totally cut off.

The result of this situation is that, where they exist, schools which go from the 5th to the 8th grade are usually of poor quality; hence the well-known "Brazilian pyramid", as shown by the following figures.

The serious gaps in the formal education system have led the Brazilians to introduce special remedial systems known as "suppletive".

MOBRAL is an adult literacy movement which has in a few years succeeded in making almost ten million adults literate.

CHAPTER II

THE COST AND FINANCING OF F.M.T.V.E.

This Chapter contains a study of the costs incurred by F.M.T.V.E. from its establishment up to 1976 and also projected estimates up to 1985. These estimates are based on plans for expanding the system which have been programmed by F.M.T.V.E. itself. The first part of the Chapter gives data on trends in real expenditure by various categories; it also contains information on present and projected enrolments. The second part uses data from the first part to estimate cost functions and compute average costs. Two concepts of average costs are used: one based on a cost function and the other on actual trends in enrolments over time. The third part of the Chapter deals with the sources of finance for F.M.T.V.E. The Chapter as a whole is limited to an analysis of the costs of F.M.T.V.E. and does not broach the question of its effectiveness nor that of the costs or effectiveness of the traditional system in Maranhao.

II.1 Past and future expenditure

The educational television system has been in operation since 1969. Its methods of accounting have changed in the course of time. Generally speaking the procedure followed lacks rigour in two respects: the recording of donations (mainly from the State of Maranhao) and fixed asset accounting (buildings and other facilities).

The listing of donations and of the facilities used by F.M.T.V.E. though not owned by it is done on a case by case basis and procedures are not uniform. Some of the facilities in use since 1969, including the studios and buildings of the complex, were formally donated to the Foundation in 1971 over and above the regular 1971 budget. Schools have been built by the State Secretariat for Education and charged to the F.M.T.V.E. budget. Other donations and user rights have not always been formally or rigorously accounted for.

Fixed installations affect only the investment budget for the corresponding year. Amortization charges are not computed yearly and even inventory controls by the State of Maranhao did not take place before 1975.

Using the information available and bearing in mind the fact that it is partial and heterogeneous from an accounting point of view, we made estimates of the value of the facilities used by the Foundation and not accounted for in the budget. The tables below constitute the best estimate we were able to make of the value of the F.M.T.V.E. assets whether acquired by donation or by direct purchase.

Another problem in estimating costs was the very rapid inflation rate of the Brazilian cruzeiro from 1969 to 1976 and the fact that several indexes can be used to deflate current costs in order to obtain figures in constant prices.

The table below shows the inflation rate selected, the value of the deflator calculated on the basis of this rate and the factor by which the cruzeiros of a given year must be multiplied in order to obtain 1976 cruzeiros. This factor will be used throughout this Chapter to express all costs in terms of 1976 cruzeiros.

Table I.3: The educational pyramid in Brazil

Levels	Grade	Year	Enrolment (in %)
University		1974	70
Secondary education	3rd	1973	75
	2nd	1972	87
	1st	1971	107
Basic education	8th	1970	101
	7th	1969	115
	6th	1968	133
	5th	1967	165
	4th	1966	245
	3rd	1965	318
	2nd	1964	449
	1st	1963	1,000

Source: Estatísticas da Educação Nacional 1971-1973 - MEC/SEEC, page 29.

In addition other institutions have the rôle of giving a second chance to those who were unable to attend school at the normal age. Their aims are varied: life-long training for teachers, agricultural training, technical or vocational training.

These institutions are the responsibility of the Federal Government though several States also provide them with substantial funds. It should be noted that most of the educational programmes on radio or television come within this framework; an exception is Maranhao educational television, which is unique in being integrated with the formal system.

The resources allocated to education increased slightly in the period 1970-1973 when Brazilian GDP was growing rapidly. As a proportion of GDP these resources represented 3.38% in 1973 which is noticeably below the world average. Despite the absence of reliable information it does not appear that this percentage increased much between 1973 and 1976, on account of the economic and budget difficulties at present being experienced by Brazil.

Before leaving the subject of the general organization of education in Brazil we would point out that the school year begins on 15 March and ends at Christmas and that the school year thus coincides with the calendar year, which spares the statistician a great number of problems. It should also be noted that the school day is only a half day of four hours which means a total of twenty hours for five days schooling a week and a total of 720 hours for the 180 working days in the year, which is a quarter less than in the case of, say France. This system has two important consequences: it is possible to use classrooms twice a day, in the morning with one class and in the afternoon with another; from the economist's point of view this represents a particularly rational allocation of resources. In addition the teacher who has worked for four hours in the morning is free to engage in other employment in the afternoon, a possibility which is apparently made considerable use of.

Table I.4: Development of resources allocated to education in Brazil

Year		GDP Million Cruzeiros	Financing of education by: General Total	Total: Public Sector	Federal Government	States	Communes	Private Schools	(%) GDP
1970	Cr(s)	205,539	6,067	5,532	1,546	3,346	640	535	2.95
	Index	100	100	100	100	100	100	100	
1971	Cr(s)	276,293	8,317	7,318	1,858	4,541	919	999	3.01
	Index base 100 = 1970	134	137	137	120	135	143	186	
1972	Cr(s)	361,325	11,933	10,460	3,098	6,329	1,039	1,473	3.30
	Index base 100 = 1970	175	196	189	200	189	162	275	
1973	Cr(s)	427,323	16,147	13,898	3,991	8,735	1,172	2,249	3.38
	Index base 100 = 1970	232	266	252	258	261	183	420	

Source: SG/MEC/FGU - Estatísticas da Educação Nacional, page 22.
(s) Cruzeiros at current rate.

It is clear, however, that a situation of this kind, in which it is not clear whether teaching is a full-time or half-time occupation, is detrimental to the labour market and has curious repercussions on the salary structure. From the point of view of the labour code, teaching appears to be a full-time occupation (and after all, the number of teaching hours is the same as the average for first-level teachers in France, who would never dream of regarding themselves as employed on a half-time basis). This would seem to imply a figure of approximately twice the minimum salary as the basic legal salary for a teacher. We found, however, in the State of Maranhao that it was not unusual for teachers in both the public and the private sector to receive only the minimum salary or less. The conclusion may be drawn that if candidates can be found to act as teachers at these rates it is because most of them have a second job and regard their teaching job as only a half-time occupation.

II. SPECIFIC FEATURES OF EDUCATION IN MARANHAO

II.1 The economic context in the State of Maranhao

Maranhao is one of the 22 States of the Federal Republic of Brazil. With an area of a little more than 300,000 square kilometres, i.e. of a size comparable to that of Italy or the Federal Republic of Germany, it has only three million inhabitants and hence a low average density of 10 inhabitants to the square kilometre.

Maranhao is situated on the edge of the semi-arid regions of the north-east (the famous Sertao) and of the vast humid plain of the Amazon.

Its capital, São Luis, is situated on the shores of the Atlantic Ocean only a few degrees south of the Equator.

Maranhao is one of the poorest States in Brazil. Its main resources are agricultural in origin, the bulk of them being used for local consumption. The main food crops are rice, manioc, millet and haricot beans. The industrial crops are sugar cane and oil palm. Animal husbandry and fishing are primarily geared to local consumption.

Like Brazil as a whole, the State of Maranhao is experiencing rapid population growth of the order of 2.8% a year. There were only 1,200,000 inhabitants in 1940 and more than 3,000,000 in 1975. This growth results in a very young population structure and hence a relatively small working population.

In 1970, the date of the last census, the working population was distributed among the various sectors of the economy as follows:

	Number	(%)
Primary Sector	762,900	78.4
Secondary Sector	49,184	5.0
Tertiary Sector	161,076	16.6
Total	973,160	100.0

Thus less than one-third (32.5%) of the inhabitants of Maranhao are economically active and more than three-quarters live by subsistence farming.

It is difficult to give precise figures for the GNP of Maranhao. In 1969 the official documents estimated it at $78.4 per head and in all likelihood it did not exceed $200 in 1976, i.e. one-third of the national average.

Differences in income are very marked, as generally throughout Brazil. Here again statistics are lacking but a few indicators may be given. In November 1976 the minimum legal wage was 544 cruzeiros a month, equivalent to $46 at the official rate of exchange. According to a large number of sources it appears that many wage earners earn much less than this minimum. For example primary school teachers in towns do not earn more than half this figure. By way of an idea of the purchasing power this represents, at the same period a kilo of dried beans, the staple diet, cost 20 cruzeiros, a meal in a restaurant 50 and a pair of sandals 100; at the other end of the scale the comfortably off have an average income which is comparable to that of the well-to-do in Western countries, and a considerably greater purchasing power since the cost of domestic service is low and prequisites such as chauffeur-driven cars are more frequent.

The public authorities (the State and the communes) have limited budgets which make it impossible for them to provide community services, such as education, of high quality. The existence of moneyed classes accounts for the consequent growth of a network of private fee-paying schools, while State educational facilities continue to be far too thinly spread.

II.2 Features of the education system in Maranhao

The table below describes enrolment trends in basic schools (from 1st to 8th grade) between 1971 and 1976. The schools are broken down into four groups according to whether they are financed by the Federal Government, the State, the communes or the pupils' families (private schools). Participation by the communes is very substantial since they account for somewhat more than half of total enrolment. This is for the most part in schools which go from 1st to 4th grade. The schools for which financial responsibility is assumed by the communes are of a very low standard and have ludicrously inadequate resources.

The State of Maranhao itself finances approximately one-third of the total. The schools it administers generally cover the 1st to the 8th grades. Of the 205,000 pupils in this sector 168,300 are in the first four grades and only 36,700 in the next four grades (5th to 8th).

Since the figures relating to private or Federal schools represent almost solely pupils in the 5th to 8th grades it is clear that the State of Maranhao is having great difficulty in complying with the requirements of the new education law which makes it basically responsible for the 5th, 6th, 7th and 8th grades. Approximately 350,000 children should be attending school at this level yet only 36,000, i.e. 10%, are in fact enrolled in State schools.

Table I.5: Enrolment in basic schools in the State of Maranhao according to source of finance

Years	Population aged from 7 to 14 years	School enrolment				Total	Enrolment rate**
		Federal Schools	State Schools	Communal Schools	Private Schools		
1971	682,970	4,124	107,523	241,380	56,019	409,046	59.9
1972	698,662	5,135	123,413	260,963	64,633	454,144	65.0
1973	715,162	4,278	140,617	263,173	79,422	487,490	68.2
1974	732,295	4,198	160,219	280,403	81,123	525,943	71.8
1975*	750,227	4,846	182,649	293,410	82,824	563,719	75.1
1976	768,823	5,495	205,079	306,417	84,525	601,516	78.2

Sources: M.E.C./V.E.I./A.T.E.C./S.E. * Estimated data.

** This ratio is slightly over-estimated since actual enrolment includes children under 7 years of age (approximately 5%) or over 14 years of age (approximately 15%). Thus, although from 1971 to 1976 the apparent average ratio rose from 60 to 78%, taking into account the fact that 5% of the pupils are under 7 and 15% over 14 years of age the real average ratio in 1976 for children between 7 and 14 years of age is only about 60%.

Table I.6: Enrolment in the 5th to 8th grades in 1976(1)

	5th		6th		7th		8th		9th	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
F.M.T.V.E.	4,448	34.3	3,413	33.9	2,992	36.8	2,169	39.2	13,022	35.4
Other State Schools	8,509	65.7	6,664	66.1	5,142	63.2	3,404	60.8	2,319	64.6
Total	12,957	100	10,077	100	8,134	100	5,533	100	36,741	100

From the point of view of the quality of education the State of Maranhao does not differ significantly from the well-known "Brazilian pyramid". Taking the cohort which was enrolled in 1962, out of 100 pupils who were enrolled in the 1st grade at the age of 7, 37% went on to the 2nd grade, 10% to the 5th grade, 7% to the second level of secondary education and 2% were admitted to university in 1974 (on the assumption that repeating by this generation was much the same as repeating by the immediately preceding generations). Over the years, this situation has changed slightly for the better. It can be estimated that in private schools 25% of pupils now reach the 5th grade, but account should be taken of the considerable differences between the capital, Sao Luis, and the rest of the State, where the present situation is much the same as that of the generation described in the table below.

The probable reasons for this situation include the very low average living standard of the population, one of the lowest in South America, the great distances between schools and homes, the mediocre quality of teaching, the inadequate training of teachers, their low salaries, the lack of even a basic minimum of teaching material and, generally speaking, the serious administrative shortcomings, both in terms of finance and technical management and in the field of personnel.

Table I.7: Progress of a cohort between 1962 and 1974 in the State of Maranhao

Levels	Year	Grade	Flow of pupils		Dropouts	
			Total	For one thousand entrants in 1962	Absolute figures	(%)
Primary	1962	1st	86,465	1,000		
	1963	2nd	31,670	366	54,795	63.4
	1964	3rd	18,290	212	68,175	78.8
	1965	4th	10,424	121	76,041	87.9
	1966	5th	7,432	86	79,033	91.4
First secondary level	1967	1st	9,195	106	77,270	89.4
	1968	2nd	8,275	96	78,190	90.4
	1969	3rd	6,876	80	79,589	92.0
	1970	4th	6,462	75	80,003	92.5
Second secondary level	1971	1st	6,324	73	80,141	92.7
	1972	2nd	5,432	62	81,123	93.8
	1973	3rd	4,809	56	81,656	94.4
Higher	1974	1st	1,735	20	84,730	98.0

Source: S.E. (1974)

(1) There are no data on enrolment in private schools in 1976. However, in 1973 private schools catered for approximately 60% of the total number of pupils attending classes from the 5th to the 8th grades, and there is no reason to think that this proportion decreased between 1973 and 1976.

II.3 The organization of F.M.T.V.E.

The 1960's were a period of great expansion for education in the State of Maranhao. One of the priorities adopted by the State Government was the extension of schooling from the 5th to the 8th grade. Two parallel systems were devised, one for the capital, São Luis, and its suburbs and the other for the rest of the State. The latter system, known as "the Bandeirantes Projects" can be described as a system of schools based on voluntary work, participation by local communities and a limited amount of financial support from the State.

For the capital, São Luis, a team of educators was called in to draw up a plan. This group put forward the idea of an education system of a radically new type, which had been tried out for some years on a small scale in the village of Colinas. It should be said that the approach to education in Brazil was and still is highly authoritarian, particularly as regards the pupil-teacher relationship, above all in the least developed areas.

An overall plan was drawn up with a strategy based on the principle that responsibility for the system should be assumed by a small group of educators. Two essential considerations were taken into account: in the first place, the State of Maranhao suffers from a grave shortage of skilled teachers and, in addition, the pressure of social demand for education is very strong.

For the purpose of solving these problems, television appeared to offer two advantages: it provided a rapid method of responding to the demand for education and at the same time gave those traditionally responsible for the education system an opportunity to remain in the position of observers and allow the new pedagogical ideas to be tried out.

Among the main innovations mention can be made of:

The determination to gear the education system to the needs of the community. The people the reform was designed to benefit were mainly children from poor families living in shanty towns on the outskirts of the capital. It was decided that programme contents should be designed to take account of these problems and match the development of the population group concerned.

The system was not conceived merely as an arrangement aimed at "instructing" (the cognitive aspect) but as an overall educational environment. The acquisition of knowledge was not more important than the development of the child's social, emotional and psychomotor dimensions and these objectives were apparent both in programme contents and in evaluation practice.

The pupil was supposed to play an active part not only in the classroom but also in school clubs and even in the organization of the system, for which responsibility was shared on a tripartite basis by the administrators, the pupils and their families.

The working unit was not the class but a small group inside the class comprising 6 or 7 pupils. Group dynamics, group teaching and learning and peer tutoring constituted the basis of the educational process. The teachers, called "guides", played a key rôle in providing leadership for the small groups making up the class.

Television and the accompanying documents were to constitute learning media, without one medium or sub-system in any way predominating over the other.

Remedial courses were to be organized on an individual basis making the greatest possible use of peer tutoring.

Both pupils and "guides" were to be continually assessed.

The educational process was conceived as a learning cycle with four stages

A "stimulus" presenting a "challenge" situation at the end of each televised programme.

Reflection, either individual or collective, with a view to developing an analytical and critical spirit.

The third stage is that of the individual or collective response to the stimulus, in order to complete the process of assimilation.

The final stage is that of collective evaluation and synthesis.

When one considers the state of educational philosophies and practices in the north-east of Brazil at the end of the 1960's this programme can be regarded as extremely innovative. One proof is that when, three years later, the entire educational system of Brazil underwent a major reform, the F.M.T.V.E. programme required only minor organizational adjustments.

Group dynamics

Each class begins with a televised programme lasting about 20 minutes. Generally the programme ends with a question called a "challenge" which the pupils have to analyse and discuss. The pupils work in groups of six or seven in classes averaging 45. The main task of the "guide" is to encourage the pupils to carry out the activities planned under each programme. The pupils have accompanying documents prepared and distributed by the centre as well as the equipment needed for the various experiments or educational activities. Each group elects each month from among its members a rapporteur and a leader responsible for internal discipline and for the carrying out of the various stages of the educational process. The individual or group results are presented and discussed by the rapporteur. The leaders may also ask questions of pupils belonging to other groups. The guides generally keep their own intervention to a minimum and it is quite common to see classes continuing to work normally in the absence of a guide.

However, the classes are only one part of the educational process. There are many other club activities (literature, art, political games) or practical activities (handicrafts of all kinds).

The following table shows the relative volume of the various school activities in 1976.

Saturdays are frequently used for general revision, meetings between pupils and guides or major inter-school events or galas. Schools have no heads or principals like traditional schools. On the other hand they have one (or two) supervisors who are responsible for the smooth running of the classes.

Table I.9: Use of schooltime during 1976

	General total		Grade			
	(%)	Hours	5th Hours	6th Hours	7th Hours	8th Hours
Language	34	1,120	280	264	277	299
Social Studies	25	800	165	201	224	210
Science	30	943	208	200	269	296
Manual work	11	363	61	60	120	122
Total	100	3,257	715	726	892	924

Source: F.M.T.V.E./Curriculum Co-ordination, 1976.

The degree of pupil participation in all activities is very high. According to a former director of the system, Mr. Macedo Costa, the development of potential leaders coming from the social classes reached by F.M.T.V.E. - in other words, the poorest sectors of the population - has been one of the main reasons prompting the State authorities to exercise closer control over the system, in particular over civic and social activities.

Televised instruction

In order to prepare the participants to take their place in the system, at the beginning of each year there is a two-week training session for "guides" and a one-week initiation period for pupils in the 5th grade, i.e. those coming into the system for the first time. All the guides receive a textbook which describes the general philosophy of the system and the way it works.

The supervisors provide the link between the guides and the centre. They meet the guides at regular weekly intervals to discuss both what has been done the previous week and plans for the next week. The guides have important responsibilities since they must note what has been taught, and record individual pupils' difficulties, lesson plans and test results. These data are entered on special forms which are then collected by the supervisors and passed on to the educational co-ordination service for statistical processing.

Contact between the guides and the F.M.T.V.E. centre is maintained by monthly meetings with the centre's "instructional co-ordination department". The Director of Education often attends these meetings.

There are also various evaluation and information mechanisms that provide a further link between the schools and the centre.

These generally take the form of questionnaires devised by the centre (production or educational co-ordination services) and used in sample surveys. However, the data collection and processing system is still imperfect, largely on account of the lack of skilled personnel. The feedback processes usually take place too late, which means that the use of the information to improve programmes is not always as effective as could be wished.

Table I.10: Television programmes produced and stocked*

	1969		1970		1971		1972		1973		1974		1975	
	Recorded	Stocked	R.	S.	R.	S.	R.	S.	R.	S.	R.	S.	R.	S.
Portuguese	131		179		289		261		355	109	370	51	226	174
English	127		195		162		99		71	-	-	-	-	-
Science	85		170		221		157		185	58	225	92	110	129
Mathematics	104		188		321		287		339	101	375	94	262	170
History	65		92		131		159		183	51	159	41	104	126
Geography	66		92		169		171		189	48	162	41	106	133
Manual work	16		170		208		172		190	67	230	24	110	86
Education programme	48		90		74		-		-	-	-	-	110	-
French	121		-		-		-		-	-	-	-	-	-
Moral and civic education			75		97		114		78	24	69	18	28	95
Drawing					42		-		-	-	-	-	-	-
Health education							82		-	-	-	-	-	20
Art education							171		139	35	115	50	56	122
Social and political organization							158		131	51	142	21	103	57
Physical education							70		71	-	58	14	-	-
Social studies									07	-	129	82	53	-
Special broadcasts									125	-	148	-	39	0
Religion										-	28	-	66	35
Preparatory classes										-			05	0
Total	763		125		1,714		1,901		2,063	554	2,210	508	1,229	1,147

Source: F.M.T.V.E./Curricula Co-ordination/1975.

* In 1972 the national reform of education altered programmes and their content with the result that there was a break in the series; foreign languages were given up very early on.

Production and transmission

The material needed for the operation of the system is prepared in the São Luis centre by teams specializing in the writing and production of educational television programmes or of the accompanying aids. The nature and form of the relationship between these different teams have varied over the years but generally speaking it is the educationists who have always carried the most weight. The rôle of the production service ranges from the conception of programmes to their evaluation. However, for a number of reasons the actual work of production has tended to thrust the tasks of reflection, analysis and self-criticism into the background.

Table I.10 indicates the annual production of television programmes. Up to 1974 the lack of tapes made it necessary for teams to remake all their programmes each year, which involved an enormous amount of work. Today these difficulties have been solved and many programmes are kept in store from one year to the next, with the result that it is now possible to give greater thought to contents, methods and results.

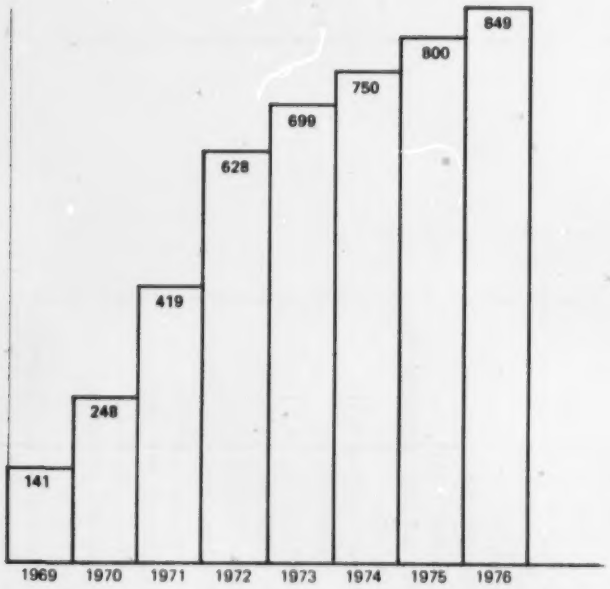
In the earlier television programmes, the camera usually remained focused on the teacher. Today's programmes comprise an increasing number of extracts from films, illustrations in the form of photographs or drawings, or brief passages of written material. Each programme must have a specific objective.

Broadcasts are so programmed that lessons for pupils in the fifth and eighth grades are shown in the morning and those for the sixth and seventh grades in the afternoon, which makes it possible to use the same classroom twice daily. Classrooms were formerly used for adult evening classes as well but this programme has been discontinued.

Administration

The table below shows staff trends between 1969 and 1976.

TABLE I. 11

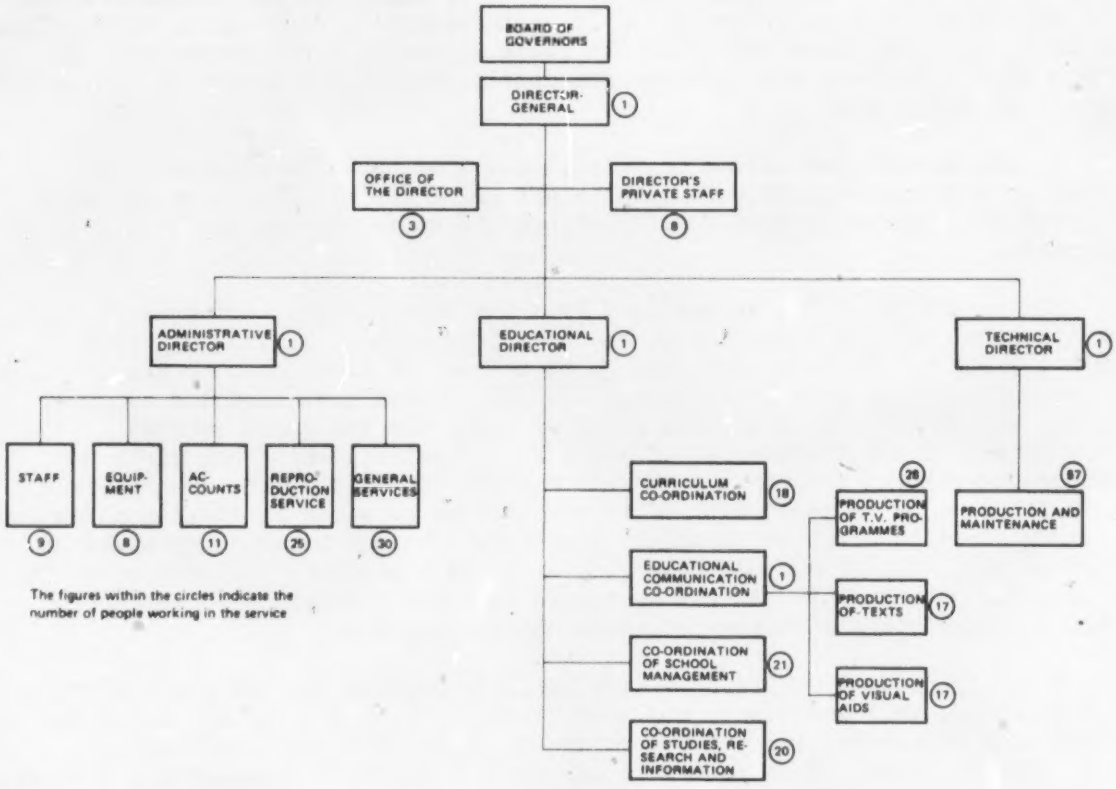


Source: F.M.T.V.E./CEPI

In 1976, 95 employees were made available for other activities in the Secretariat for Education. The number is not known for the previous years but the proportion appears to have been the same.

Out of a total staff of 850, approximately 570 are employed in schools and 280 at the São Luis production complex. Staff in schools comprises 470 guides(1), 30 supervisors and 70 service staff. The production complex comprises a number of services organized as shown on the chart below:

ORGANIZATION CHART OF THE SÃO LUIS COMPLEX



The system went through a stage of rapid expansion between 1969 and 1972. Since then the number of pupils has been more or less stabilized whereas the number of staff has continued to increase slightly. Part of the increase in personnel is to an increase in the number of replacements, the secondment of a number of staff to different services in the Secretariat and an increase in administration. A small proportion of the new personnel was recruited under the influence of political pressure.

(1) Including those on leave (sick leave, maternity leave, training, attendance at courses), or secondment to the Secretariat for Education.

When one considers the total weight of administration in F.M.T.V.E. one is struck by two facts:

the relative cost of administration is high

the number of employees is large.

However, the relation between these two facts which seems obvious at first sight, is misleading. A significant proportion of the administrative staff consists of porters, domestics, caretakers, messengers, drivers and handymen. Such employees receive very low wages and their total cost is relatively low: to reduce the number of them would create new unemployment without greatly reducing overall expenditure.

The fact that despite these low wages the cost of administration is high is due to the very substantial salaries earned by qualified administrative staff. These salaries are probably justified by comparison with national or international standards, provided those occupying the posts in question are competent. In certain cases, however, they are not adequately qualified and some of them could usefully be redeployed.

To sum up our conclusions on this point, what we would recommend is neither an absolute reduction in total staff nor a drastic reduction in costs but great care in seeing that qualifications are suited to the level of employment.

The system is highly centralized from the point of view not only of production but also of transmission and decision-making. A small group of people assists the Director-General. Next come three Directors who are theoretically at the same level except that the Educational Director slightly outranks the others. From a legal point of view, the system is managed independently of the Secretariat of State for Education, which has given the Director-General and his staff a mandate for its administration. There are a few basic rules but a great deal of flexibility is possible in their application. The Administrative Director is mainly concerned with the internal problems of the production complex and his only link with the schools is his responsibility for personnel management. As the system is extended a substantial extension of his prerogatives and responsibilities can be expected.

A few organizational reforms were recently decided on. In particular, the television, text and visual aid production services are now all under the control of a department for the co-ordination of educational communication, run by educationists. This reform is expected to improve communication between the curriculum specialists and the producers.

The Board of Governors, notwithstanding its hierarchical and political importance, has in fact little influence on the operation of the system apart from providing it with the necessary official backing. It is chaired by the Secretary of State himself and consists of seven members. It has always actively supported the management of F.M.T.V.E., and it is well known that the Secretary of State, who plays a key rôle on the board, keeps up regular contacts of both a formal and informal nature.

These contacts are solely at the level of general policy and not at the technical level. The result is that there is an increasingly wide separation at the level of educational thinking between the F.M.T.V.E. and the State Secretariat. This autonomy, which was essential to begin with, may become a major obstacle in the future.

Table II.1: Rate of inflation in Brazil

Years	Rate of inflation(a) in %	Deflator(b)	Conversion factor into 1976 cruzeiros(c)
1969	22.3	26	3.85
1970	19.8	31	3.23
1971	20.4	38	2.63
1972	17.0	45	2.22
1973	15.1	53	1.89
1974	28.7	61	1.64
1975	27.7	78	1.28
1976	-	100	1.00

(a) The rate of inflation shown is that of the current year over the preceding year. Thus, 22.3% means that 1969 prices were 22.3% above those of 1968. The prices taken into account here are those of the GNP which was the highest of the three rates indicated in the report by MALAU P.S. and BONELLI R. - The Brazilian economy in the seventies: old and new development - Rio de Janeiro, IPEA, July 1976.

(b) This deflator shows what would have been the average cost of an item sold for 100 cruzeiros in 1976, the reference year. For example an item worth 100 cruzeiros in 1976 should have cost only 45 cruzeiros in 1972.

(c) This conversion factor into 1976 cruzeiros shows the figure to be used for multiplying the costs of a given year in order to transform them into 1976 prices. For example, 1972 prices should be multiplied by 2.22 for purposes of comparison with those of 1976.

System expenditures from 1969 to 1976

The tables below show the trend of annual expenditure by F.M.T.V.E. for the period 1969-1976. Capital expenditure can be categorized by function more accurately than current expenditure, for which an accurate break-down could be provided only for 1976. Table II.3 summarizes total costs and also shows trends in total enrolments over this period.

Projected system expenditures from 1977 to 1985

Since we know accurately and in detail the expenditures incurred in 1976 and the plans for expansion drawn up by the management of F.M.T.V.E. it is possible to project the costs of the system by function up to 1985. Naturally, if expansion plans change the cost projections below should be correspondingly corrected. The basic data given here make it possible to calculate the financial implications of possible variations in the expansion plan.

Table II.2: Capital expenditure 1969-1976

Unit: One thousand 1976 cruzeiros

Year / Cruzeiros	1969(a)	1970(a)	1971	1972	1973	1974	1975	1976
Construction of buildings and the transmitter	9,486	2,125	3,958	5,592	1,207	1,722	1,056	2,378
Equipment for studios and transmission equipment	4,419	3,042	1,067	675	386	464	193	0
Furniture for the schools and the complex	346	539	237	142	170	462	221	48
Television receivers	393	1,114	13	-	-	392	105	58
Vehicles	0	232	0	47	43	48	45	45
Total:	14,644	7,043	5,275	6,456	1,806	3,088	1,620	2,529

(a) The 1969 and 1970 figures include elements received at a later date and not included in the budget. These donations represent 68 per cent of the 1969 investment budget at 55% of the 1970 investment budget.

Table II.3: Total expenditure from 1969 to 1976

Unit: One thousand 1976 cruzeiros

	1969	1970	1971	1972	1973	1974	1975	1976
Capital expenditure	14,644	7,043	5,275	6,456	1,806	3,088	1,620	2,529
Operating expenditure(a)	2,580	5,216	5,446	9,770	12,275	17,870	16,520	24,167
Total expenditure	17,224	12,620	10,721	16,226	14,080	20,960	18,140	26,700
Enrolments	1,255	6,251	9,415	12,619	12,911	12,124	12,479	13,022

(a) Throughout this period F.M.T.V.E. omitted to pay social security contributions for its employees. These contributions, which represent 36.5% of gross salary, are now being called in, and if the expenditure in question were added on for the corresponding years the figures shown here should be increased by 20 to 30%.

Tables II.4 to II.7 deal respectively with projections of administrative costs, production costs, transmission costs and reception site costs. For both administration and production costs we have assumed that annual costs in real terms will remain constant up to 1985; in particular, we have not envisaged any new building or studio equipment, only replacements for vehicles.

The evaluation of transmission costs (Table II.6) includes substantial funds for the extension of television coverage with new retransmitters, to take place in three instalments from 1977 to 1979, as well as the replacement of the present transmission station in 1981, i.e. ten years after it was brought into service.

Table II.4: Projected administration costs (1977-1985)

Unit: One thousand 1976 cruzeiros

Nature	Annual cost
Salaries	3,073
Fringe benefits	1,119
Materials and services	1,092
Vehicles	50
Equipment	65
Total	5,399

Note: We have assumed that the real costs of administration will remain constant up to 1985.

Table II.5: Projected production costs (1977-1985)

Unit: One thousand 1976 cruzeiros

	Annual costs		
	Personnel	Materials & services	Total
Production of curricula	1,670	10	1,680
Production of television programmes	2,913	152	3,065
Production of accompanying documents	934	20	945
Total	5,517	182	5,699

Table II.6: Projected transmission costs

Unit: One thousand 1976 cruzeiros

Years	Building(a)	Equipment	Vehicle(c)	Personnel(d)	Operation(e)	Total
1977	4,000	1,770	150	395	156	6,471
1978	3,550	1,230	75	530	226	5,611
1979	4,380	1,450	90	806	366	7,092
1980	-	-	80	806	366	1,252
1981	-	500(b)	80	806	366	1,752
1982	-	-	80	806	366	1,252
1983	-	-	80	806	366	1,252
1984	-	-	80	806	366	1,252
1985	-	-	80	806	366	1,252

(a) These are buildings required to extend the transmission network.
(b) It is assumed that the present transmitter will be partially renovated in 1980.
(c) After 1981 it is planned to replace two vehicles a year.
(d) Personnel comprises the present team together with guards and maintenance staff for the future extension.
(e) Operation includes the cost of electricity, materials and services calculated in proportion to current real costs.

The estimate for the reception site costs (Table II.7) are based on the F.M.T.V.E. assumptions regarding the creation of new classrooms in the system extension area and its estimates of future enrolments. These plans for school building between 1977 and 1979 will result in leaving some classrooms unoccupied until the beginning of the 1980's, when the new pupils in 5th grade will have reached the 8th grade.

Table II.7: Projected reception site costs

Unit: One thousand 1976 cruzeiros

Years	Teachers	Classrooms	Furniture	Operation	TV sets		Supplies		Total
					New	Replaced	Reproduction of accompanying documents	Other supplies	
1977	7,663	4,736	132	2,187	163	120	1,188	385	16,574
1978	8,760	4,546	128	2,187	153	151	1,358	440	17,723
1979	10,623	7,163	208	2,187	249	201	1,647	533	22,811
1980	13,719	-	84	2,187	-	201	2,127	689	19,007
1981	16,532	-	84	2,187	-	201	2,563	830	22,397
1982	18,537	-	84	2,187	-	201	2,874	931	24,814
1983	20,344	-	84	2,187	-	201	3,154	1,021	26,991
1984	20,344	-	84	2,187	-	201	3,154	1,021	26,991
1985	20,344	-	84	2,187	-	201	3,154	1,021	26,991

1. Teachers

The average monthly salary including fringe benefits, amounts to approximately 1,500 cruzeiros, i.e. an annual cost per pupil of:

$$\frac{1,500 \times 12}{42} = 430 \text{ cruzeiros}$$

Thus the total cost equals N (number of pupils) x 430 x 1.32; the factor 1.32 has been selected on the basis of past experience to take into account absences, maternity leave, retraining periods, etc.

2. Classrooms

(a) $\frac{\text{Total number of square metres in 1976}}{\text{Number of pupils}} : \frac{100,000}{13,000} = 0.82 \text{ m}^2$ per pupil;

at 1,000 cruzeiros per m^2, the cost per pupil is 820 cruzeiros.

(b) Total cost of new classrooms: price of m^2 per pupil multiplied by the number of new pupils covered by the extension, viz.:

5,880 in 1977
5,544 in 1978
8,736 in 1979

3. Furniture

(a) Calculated on the basis of 2,000 cruzeiros per classroom at the date of construction.

(b) After 1980 a depreciation rate of 10% has been calculated for the total of 420 classrooms.

4. Operations

These costs comprise supplies, salaries and fringe benefits, invoiced services, water and electricity. They total 162 cruzeiros per year per pupil.

5. Receiving sets

(a) New sets: 2,200 cruzeiros multiplied by the number of new classrooms.

(b) Replacements: 20% of the total value of the sets in stock, each year.

6. Equipment

(a) Reproduction of accompanying documents

Each pupil receives eight documents a year, the total annual cost of which is 1,137,000 cruzeiros. The cost of one document is: $\frac{1,137,000}{13,000 \times 8}$, approximately 11 cruzeiros a document or 88 cruzeiros for each pupil. This figure of 88 has accordingly been multiplied by the number of total enrolments for each year. It should be recalled that what we are concerned with here is costs, not budgetary appropriations or financing, the latter being provided jointly by F.M.T.V.E. and pupil participation.

(b) Other equipment

Calculated on the basis of 1976 costs, i.e. 28.50 cruzeiros per pupil.

The table below groups together the projected costs of the different functions from 1977 to 1985.

Table II.8: Overall projected costs from 1977 to 1985

Unit: One thousand 1985 cruzeiros(1)

Years	Administration	Production	Transmission	Reception	Total
1977	5,399	5,699	6,471	16,574	34,143
1978	5,399	5,699	5,611	17,723	34,432
1979	5,399	5,699	7,092	22,811	41,001
1980	5,399	5,699	1,252	19,007	31,357
1981	5,399	5,699	1,752	22,397	35,247
1982	5,399	5,699	1,252	24,814	37,164
1983	5,399	5,699	1,252	26,991	39,341
1984	5,399	5,699	1,252	26,991	39,341
1985	5,399	5,699	1,252	26,991	39,341

(1) Reviser's note: should this be 1976?

Costs and enrolments from 1969 to 1985

The table below brings together the figures in Tables II.3 and II.8 and provides an overall picture of expenditures and enrolments, both real and projected, throughout the period.

The costs are in thousands of 1976 cruzeiros. They include operating and investment costs.

Table II.9: Real and projected costs and enrolments from 1969 to 1985

Years	Costs	Enrolments
1969	17,224	1,304
1970	12,260	6,251
1971	10,721	9,415
1972	16,226	12,619
1973	14,080	12,911
1974	20,960	12,124
1975	18,140	12,479
1976	26,700	13,022
1977	34,143	13,504
1978	34,432	15,436
1979	41,001	18,712
1980	31,357	24,172
1981	35,247	29,128
1982	37,164	32,656
1983	39,341	35,840
1984	39,341	35,840
1985	39,341	35,840

II.2 Calculation of total and average costs

In this section we shall use the data from the foregoing tables to construct a cost function for F.M.T.V.E. We shall then revert to Table II.9 in order to compute the indices of average cost since the beginning of the system up to the end of the projection period, taking into account past, present and future data.

Cost functions

We shall present system cost functions on the assumption that total costs may be separated into two elements: one fixed, and the other which is proportional to the number N of pupils in the system. The cost function can then be written:

$$TC(N) = F + VN,$$

where TC(N) is the annual operating cost of the system when it caters for N pupils; F is the fixed cost and V the additional cost when a new pupil is enrolled.

As F and V are both partly capital costs and partly operating costs the capital costs have to be "annualized" and then added to the operating costs. The annualized capital cost can be taken as being equivalent to the amount the system would have to pay each year if the equipment had been bought on hire purchase instead of being paid for outright on delivery.

Annualized costs depend on three variables: the initial purchase price, the expected length of life of the equipment and the rate of return within the economic system (rate of interest). For purposes of comparison we shall choose the annualized costs resulting from the use of three rates of interest: 0, 7.5 and 15%.

Table II.10 shows the elements of V, the variable cost per pupil per year. Part A corresponds to the annual operating costs and Part B shows the annualized capital costs in terms of the three rates of interest selected. Part C totalizes all the variable costs for each rate of interest.

Table II.10: Variable costs per pupil per year

Unit: 1976 cruzeiro

A.	Operating costs			
	Teachers		568	
	Other operating costs		162	
	Accompanying documents		88	
	Other supplies		29	
	Total		847	
			Discount rate	
B.	Annualized capital costs	0%	7.5%	15%
	Furniture (duration of life: 10 years)	3	4	5
	TV receiving sets (duration of life: 5 years)	6	7	9
	Classrooms (duration of life: 30 years)	27	70	125
	Total	35	81	139
C.	Total variable costs (A+B)	883	928	986

Tables II.11 and II.12 show annualized fixed costs, on the basis respectively of the value of current equipment in 1976 and on that of the equipment programmed up to 1980. There are plans for a substantial increase in the transmission network between now and 1980 and the higher figure for F at that date merely reflects the expansion of the system (see below).

Table II.11: Total fixed costs per year
(on the basis of 1976 equipment)

Unit: One thousand 1976 cruzeiros

A.	Operation			
	Production(a)		5,699	
	Transmission		345	
	Administration		5,284	
	Total		11,328	
B.	Annualized capital costs(b)	0%	7.5%	15%
	Buildings (duration of life: 30 years)	116	295	531
	Equipment (duration of life: 10 years)	501	729	998
	Vehicles (duration of life: 5 years)	24	59	71
	Total	641	1,083	1,600
C.	Total annualized fixed costs (A+B)	11,969	12,411	12,928

(a) Operating costs for production are divided between the preparation of curricula (30%), of television programmes (53%) and of accompanying documents (17%).

(b) Capital fixed costs are estimated on the basis of the value of the physical capital available in 1976. As regards the fixed cost element this comprises: value of buildings 3,448,000 Cr.; value of equipment: 5,007,000 Cr.; value of vehicles: 238,000 Cr.

Table II.12: Total fixed costs per year in 1980

Unit: One thousand 1976 cruzeiros

A.	Operation			
	Production		5,699	
	Transmission		1,172	
	Administration		5,284	
	Total		12,155	
B.	Annualized capital costs(a)	0%	7.5%	15%
	Buildings (duration of life: 30 years)	514	1,305	2,348
	Equipment (duration of life: 10 years)	946	1,377	1,885
	Vehicles (duration of life: 5 years)	1,547	2,819	4,398
C.	Total annualized fixed costs (A+B)	13,702	14,974	16,553

(a) Capital costs are the same as in the previous table, plus planned investment for 1977-1979, i.e. 11,930,000 cruzeiros for building, 4,450,000 for equipment and 315,000 for vehicles.

The equations below use the data in Tables II.10 and II.12 to construct the system cost functions expressed in thousands of 1976 cruzeiros.

1976:

TC(N) = 11,696 + 0.883 N for a discount rate of 0

TC(N) = 12,411 + 0.928 N for a discount rate of 7,5%

TC(N) = 12,928 + 0.986 N for a discount rate of 15%

1980:

TC(N) = 13,702 + 0.883 N for a discount rate of 0

TC(N) = 14,974 + 0.928 N for a discount rate of 7.5%

TC(N) = 16,553 + 0.986 N for a discount rate of 15%

Using these total cost functions (TC) it is possible to construct an average cost function AC(N) simply by dividing the total cost figures by the number of pupils N.

Table II.13 gives some average cost figures calculated as a function of the number of pupils for 1976 and 1980. Here we have used cost functions with a discount rate of 7.5%.

We have then showed these results in a graph (Graph II.1).

Table II.13: Average annual cost per pupil

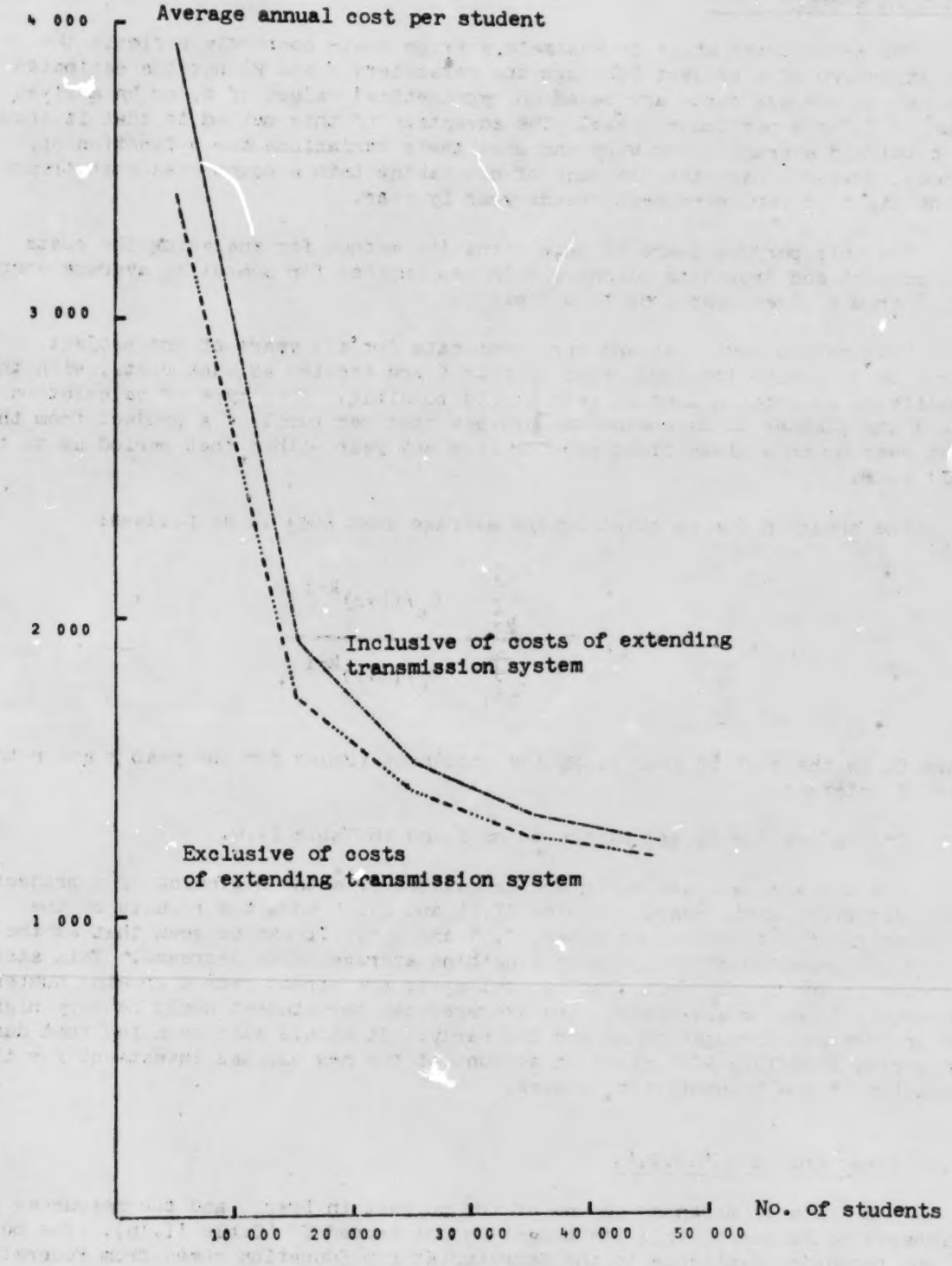
Unit: 1976 cruzeiro

Number of pupils N	(a) TC(N) = 12,411 + 0.928 N (1976)	(b) TC(N) = 14,974 + 0.928 N (1980)
5,000	3,410	3,923
15,000	1,755	1,926
25,000	1,424	1,527
35,000	1,283	1,356
45,000	1,204	1,261

(a) This cost function is based on the present transmission network. Capital costs are annualized at a rate of 7.5%.

(b) This cost function includes investment required to extend the transmission system from 1977 to 1979 and capital costs are also annualized at a rate of 7.5%.

Taking into account the fact that there were 13,022 pupils in the system in 1976, the 1976 cost function can be used to compute the real average costs per pupil. With a discount rate of 7.5% this average cost is 1,880 1976 cruzeiros. According to the planned extension programme the total will rise in six or seven years to 35,840 pupils. Taking the 1980 cost function, the average cost, with a discount rate of 7.5%, will then be 1,340 1976 cruzeiros a year.



Graph II.1: COSTS PER STUDENT IN RELATION TO TOTAL ENROLMENT

Trends in average costs

The method used above to estimate average costs correctly reflects the cost structure of a project (through the parameters V and F) but the estimates of total or average costs are based on hypothetical values of N, or on a given value of N for a particular year. The advantage of this method is that it shows how total and average costs vary and what their variations are a function of. It does, however, have the drawback of not taking into account real cost trends in the light of real enrolment trends year by year.

For this purpose there is an alternative method for analysing the costs of a project and providing planners with new indices for computing average costs (AC_{ij}) from a given year i up to a limit j.

This method uses cost and enrolment data for all years of the project from i to j. Costs incurred prior to year i are treated as sunk costs, with the simplifying assumption that no recovery is possible. This type of calculation allows the planner to determine the average cost per pupil of a project from the first year up to a given limit year or from any year within that period up to the limit year.

The equation for calculating the average cost AC_{ij} is as follows:

$$AC_{ij} = \frac{\sum_{k=i}^{j} C_k/(1+r)^{k-i}}{\sum_{k=i}^{j} N_k/(1+r)^{k-i}}$$

where C_k is the cost of year k; N_k the enrolment figure for the year k and r the rate of interest.

The values for C_k and N_k are to be found in Table II.9.

Where i = 1, average costs are calculated from the beginning of a project up to different limit years. Tables II.14 and II.15 show the results of the calculations for two discount rates, 7.5% and 15%. It can be seen that as the period of operation of the project lengthens average costs decrease. This steady decrease is due to the fact that capital costs are spread over a growing number of students. As one would expect, the average cost per student would be very high if the project were brought to an end too early. It should also be noted that during the period 1976-1979 AC_{ij} rises on account of the new capital investment for the extension of the transmission network.

II.3 Financing of F.M.T.V.E.

The State of Maranhao is one of the poorest in Brazil and the resources it allocates to education from its budget do not exceed 7% (Table II.16). The bulk of the resources available to the Secretariat for Education comes from Federal Funds.

Table II.14: Average costs AC_{1j} at a rate of 7.5%

Unit: 1976 cruzeiro

Limit year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1969	13 208	4 021	2 483	2 004	1 752	1 748	1 702	1 748	1 836	1 878	1 942	1 841	1 769	1 702	1 643	1 597	1 561
1970		1 961	1 481	1 398	1 310	1 394	1 403	1 491	1 610	1 678	1 734	1 683	1 628	1 576	1 528	1 492	1 463
1971			1 138	1 220	1 175	1 303	1 331	1 438	1 576	1 654	1 717	1 665	1 609	1 556	1 508	1 472	1 444
1972				1 285	1 190	1 351	1 374	1 494	1 645	1 724	1 785	1 718	1 651	1 588	1 534	1 493	1 462
1973					1 090	1 388	1 408	1 556	1 733	1 813	1 872	1 782	1 696	1 621	1 558	1 511	1 475
1974						1 728	1 594	1 741	1 927	1 988	2 026	1 893	1 777	1 681	1 604	1 548	1 506
1975							1 453	1 747	1 995	2 058	2 087	1 920	1 784	1 676	1 592	1 533	1 489
1976								2 050	2 285	2 266	2 245	2 007	1 832	1 702	1 606	1 540	1 492
1977									2 528	2 374	2 307	1 997	1 796	1 657	1 558	1 493	1 447
1978										2 230	2 209	1 854	1 658	1 533	1 447	1 393	1 356
1979											2 191	1 703	1 516	1 408	1 338	1 297	1 269
1980												1 297	1 251	1 210	1 180	1 164	1 153
1981													1 210	1 173	1 147	1 136	1 128
1982														1 138	1 117	1 111	1 108
1983															1 097	1 097	1 097
1984																1 097	1 097
1985																	1 097

The data given in this table represent the total amount of expenditure incurred by the project up to the selected limit year, divided by the total number of pupils enrolled over the same period. Each of these totals has been discounted at a rate of 7.5%.

Table II.15: Average costs AC_{ij} at a rate of 15%

Limit year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1969	13 208	4 137	2 597	2 105	1 852	1 831	1 781	1 810	1 873	1 902	1 924	1 874	1 822	1 774	1 731	1 698	1 672
1970		1 961	1 494	1 411	1 327	1 398	1 405	1 476	1 571	1 625	1 670	1 640	1 605	1 572	1 541	1 518	1 499
1971			1 138	1 217	1 176	1 292	1 317	1 409	1 522	1 587	1 640	1 609	1 575	1 541	1 510	1 487	1 469
1972				1 285	1 193	1 342	1 364	1 469	1 597	1 665	1 719	1 676	1 630	1 588	1 550	1 522	1 500
1973					1 090	1 377	1 399	1 533	1 689	1 762	1 816	1 752	1 690	1 635	1 588	1 554	1 527
1974						1 728	1 598	1 734	1 903	1 960	1 996	1 892	1 800	1 723	1 661	1 616	1 582
1975							1 453	1 737	1 974	2 033	2 064	1 926	1 813	1 722	1 651	1 602	1 565
1976								2 050	2 277	2 262	2 244	2 035	1 879	1 765	1 679	1 620	1 578
1977									2 528	2 379	2 314	2 031	1 845	1 717	1 626	1 566	1 524
1978										2 230	2 210	1 876	1 691	1 574	1 493	1 443	1 408
1979											2 191	1 718	1 537	1 434	1 367	1 328	1 301
1980												1 297	1 252	1 214	1 186	1 170	1 161
1981													1 210	1 174	1 149	1 138	1 132
1982														1 138	1 118	1 112	1 109
1983															1 097	1 097	1 097
1984																1 097	1 097
1985																	1 097

Table II.16: Sources of finance

	Total budget of the State of Maranhao(a)	Expenditure on Education(b)			F.M.T.V.E.				
		Total	State funds	Federal funds	Total	State funds	MEC/ PRONTEL	Polamazonia	Ministry of Planning
1969	531 049	(c)	31 966	--	7 249	7 249			
1970	476 977	(c)	40 510	--	8 356	8 356			
1971	640 176	91 550	50 262	41 288	9 152	9 152			
1972	743 910	103 726	57 415	46 311	11 610	11 610			
1973	923 217	124 206	49 149	75 057	12 873	12 587	45		241
1974	1 231 272	123 000 (d)	56 278	66 722	20 960	12 227	4 595		4 138
1975	1 380 917	107 200	44 708	62 492	27 084	16 416	220		448
1976	--	--	--		32 669 (f)	23 409	1 690	7 570	
1977	--	--	--		69 100	50 100	12 000	7 000	

Notes for Table II.16

(a) Source: BALANÇOS DO ESTADO DE MARANHAO 1969-1975.
All figures are in thousands of 1976 cruzeiros.

(b) Source: Secretariat for Education of the State of Maranhao.

(c) Totals are not available for 1969 or 1970.

(d) Interpolated estimate.

(f) Source: F.M.T.V.E.
Most of these figures are lower than those shown in Table II.9.

F.M.T.V.E. receives a substantial share of the State education budget, and it was only from 1974 onwards that it received funds from elsewhere. The first source of outside financing was PRONTEL, the National Co-ordination Agency for Educational Television. This official recognition of F.M.T.V.E. subsequently made other contributions possible, in particular from the Federal Ministry of Planning.

Since part of the State of Maranhao belongs to the Amazonian region (as officially defined) it was possible to include F.M.T.V.E. in a vast programme for developing education in that region, the POLAMAZONIA Programme, to which special resources are allocated. This made it possible for F.M.T.V.E. to extend the programme for expanding the system to a large number of villages. As a corollary this plan brought about the active participation of the Federal Ministry of Education through PRONTEL, so that funds from this Ministry totalling 20 million cruzeiros will be added to the 20 million cruzeiros from POLAMAZONIA during the period 1976-1980. These resources will make it possible to expand the project provided that the State of Maranhao maintains its participation at the same level. The only outstanding problem is that of building schools where as yet none exist.

The fact that F.M.T.V.E. was able to obtain outside funds is a brilliant demonstration not only of its management and negotiating ability but also of the fact that it is recognized as a positive experiment and as one way for the local authorities of a poor State to obtain additional resources for education.

CHAPTER III

ANALYSIS OF THE EFFECTIVENESS OF THE EDUCATIONAL TELEVISION SYSTEM IN THE STATE OF MARANHAO

III.1 Methodological comments

One of the problems involved in making a cost-effectiveness analysis of an educational technology is that outputs have to be quantitatively evaluated on the same basis as costs, i.e. in terms of a monetary unit, and there are considerable conceptual and empirical difficulties in the way of a monetary evaluation of the results of an educational process.

There are three possible approaches to the solution of this problem, with a wide range of possible methodologies for each of them, depending on the data available. The first, and most ambitious, of these approaches, can be described as absolute, the other two as relative.

A. Absolute measurement of the economic effectiveness of an educational technology

The absolute measurement of the economic effectiveness of an educational technology aims at comparing the cost of an education with its results, which are measured by its influence on production. The educational process creates a trained - and hence a qualified - individual, who turns his qualification to account on the labour market and whose productivity is higher than it would have been if he had not been educated. If the increase in productivity can be related to the education received, a comparison in monetary terms becomes possible.

Economists have suggested a number of methods in recent years.

Thus, the calculation can be made from the point of view of the individual receiving the education.

Alternatively, it can be made from the point of view of the society participating in its cost.

Both these approaches can be applied either by calculating a rate of return or by expressing both cost and productivity gain in terms of the values prevailing at the point in time between the completion of education and the commencement of employment and comparing them on that basis.

Other analyses have adopted a macro-economic approach. Thus, DENISON(1), discussing the estimation of a GNP production function, suggested a cause-and-effect relationship between educational investment and the unexplained portion of the increase in the GNP; and TINBERGEN(2), using cross-data relating

(1) cf. DENISON E. - Le facteur résiduel et le progrès économique - OECD, Paris 1964 - 311 p.

(2) TINBERGEN J. and BOD H.C. - A planning model for the educational requirements of economic development - Econometrics models of education, Paris, OECD, 1965.

the GNP growth rate to differences in the qualification structure of the manpower factor, highlighted the differential productivity of the three main educational levels (primary, secondary and higher) by comparison with a nil level (no educational qualification at all).

All these methods have the same theoretical basis in that they postulate a strict cause-and-effect relationship between the education received by an individual and the fact that throughout his working life he receives higher remuneration than an individual who has received no education. This theory, known as the "human capital" theory, has been strongly criticized in recent years on both theoretical and empirical grounds. Without going into detail, we may say that there is general agreement among economists of all schools that the relationship between the two factors (education costs and productivity increments) is not strict and that other factors besides education are responsible, all of them in indeterminate proportions, for remuneration differences. In other words, the current view is that education probably does have a postive influence on the production of goods and on the level of remuneration, but that this influence cannot be measured with sufficient precision to allow the effectiveness of an educational process to be absolutely assessed in monetary terms.

B. Relative measurements of the economic effectiveness of an educational technology

Even if we abandon the idea of measuring the absolute effectiveness of given educational technology, it is still possible for alternative technologies to be meaningfully compared.

Two approaches are possible:

The first presupposes a constant budget and aims at finding the technology that will ensure the highest output obtainable within that budget. Output can be measured by various indicators, e.g. the number of individuals educated to a given level, or the quality of the education received by a given number of individuals. This last method is the most widely used; given two groups of individuals with the same characteristics at the pre-education stage, the object is to find which technology will maximize the educational performance of the individuals concerned.

This can be measured by:

- standard tests given to both groups;
- differences in repeating rates;
- differences in dropout rates;
- differences in success rates at the higher levels of the educational system.

The second approach sets itself identical educational objectives, but here it is the number of individuals and the level of their education that have been pre-determined by society, and what is sought is the technology that will enable this goal to be attained at the lowest possible cost.

C. Unsolved difficulties in the measurement of effectiveness

The advantage of the two foregoing approaches is that they make it possible to form a definite judgement as to which technology is most effective - and should therefore be chosen by the decision-maker - without having to measure the usefulness of the education provided in relation to its cost.

Evaluation becomes more complicated when one technology is both more costly and educationally more effective than another. In this case, in order to establish a preference, it becomes necessary to measure the extra cost against the extra effectiveness, which brings us back to the first approach we considered, namely, the absolute measurement of a system's effectiveness. The same thing applies when a technology is both less costly and educationally less effective.

In the case of television-based technologies, it is not unusual to find that they are more expensive than traditional technologies, and somewhat more effective educationally, while in the case of educational sound broadcasting, the cost is generally lower but effectiveness is reduced.

III.2 Educational effectiveness of the system

With a few exceptions, which we shall consider later, the data that can provide some indication of the system's educational effectiveness are all internal in origin.

Moreover, comparisons with the direct teaching system are difficult, both because data concerning the traditional school are not available and because the two systems are not comparable. In São Luis, apart from F.M.T.V.E., the sole representative of the traditional system in the public sector is a school established under the USAID programme; this school is quite atypical and cannot, for various reasons, be taken as a point of reference. There is also a large private sector, varying in standard, about which very little information is available.

It must also be borne in mind that, because of the siting of its schools, F.M.T.V.E. caters for pupils whose social background is extremely humble, even in terms of the population of São Luis.

In a recent report prepared by the office of the Educational Director of F.M.T.V.E., it was observed that pupils joining the 5th grade (i.e. the first year of F.M.T.V.E.) possessed on an average only 34% of the knowledge theoretically required for joining this grade. Specially devised tests given to all pupils commencing 5th grade showed that in the majority of subjects (language, mathematics, social studies and science) their standard of knowledge was far below the theoretical norm for this level. Taking into account the further handicap of social background, and bearing in mind the fact that pupils attending good private schools from the first to the fourth year go on to other private schools in their fifth year, we can conclude that the children studying in F.M.T.V.E. schools are on an average less well prepared at the outset than those studying elsewhere.

As will be seen from Table III.1, F.M.T.V.E. started in 1969 with 1,255 pupils, using a closed-circuit television system. In the following year, the Governor of the State exerted strong pressure to have the benefit of the system

extended to a larger segment of the population. This was made possible by the opening of new 5th grade classes and the offer of an unlimited number of places in the higher grades for pupils who had started in traditional schools. The first F.M.T.V.E. learning diplomas were awarded in 1972. From that date to 1976 the number of pupils remained more or less constant. The reason for this was that the system had already attained its maximum potential coverage by 1972 and no further increase in enrolments will be possible until wider television coverage has been provided by expansion of the transmission network.

It could be observed, however, that the system has failed to capture the clientele of the São Luis private schools - a failure that can probably be explained by the fact that the population stratum concerned, rather like the middle class in the Ivory Coast, has a certain built-in prejudice against the idea of television as an educational medium.

Table III.1: Annual enrolment trends

Year	5th Grade	6th Grade	7th Grade	8th Grade	Total
1969	1,255	-	-	-	1,255
1970	4,516	1,735(a)	-	-	6,251
1971	3,512	4,191	1,712	-	9,415
1972	3,691	3,433	3,859	1,636	12,619
1973	2,936	3,443	3,131	3,401	12,911
1974	3,614	2,723	3,099	2,688	12,124
1975	4,192	3,160	2,681	2,446	12,479
1976	4,448	3,413	2,992	2,169	13,022

Sources: Coordinação de Estudos, Pesquisas e Informações.

(a) This figure is higher than the 5th grade enrolment figure for 1969 because of direct entries at the level of the higher grade, which were fairly numerous in the early days of the system.

Table II.2 shows the promotion rates from one grade to the next. The national rates at these levels are around 90%, which is roughly what we find in F.M.T.V.E. for the last two years, when the rate fell considerably. The high rates in earlier years may have been due to the almost total absence of control and norms in a system still at the launching stage. The fall in the rate after 1974 can be explained by the abandonment of various social or psychological criteria which operated in favour of F.M.T.V.E. - in other words, underprivileged - pupils. These criteria no longer provide a basis for the award of diplomas. For the same reasons the number of dropouts during the year is tending to rise to the same level as that prevailing nationally.

Table III.2 also shows the daily attendance rate. This is exceptionally high for Brazil, a fact which can be explained by the pressure which the peer tutoring system exerts on the pupil.

Table III.3 compares the respective success rates of pupils from F.M.T.V.E. schools and from São Luis private schools in the examination for admission to secondary schools (2nd level) in 1973 and 1976. In 1973, competing on a strictly equal footing, the F.M.T.V.E. pupils did significantly better. The 1976 results are harder to interpret, although they still show a distinct superiority on the part of the F.M.T.V.E. candidates, because of the introduction of social criteria favouring the children of low-income parents (and hence F.M.T.V.E. pupils) in the examination for entrance to one of the largest secondary schools.

Table III.2: Promotion, attendance and dropout rates in F.M.T.V.E.

Year	Promotion rate(a)	Average daily attendance rate	Percentage of dropouts during the year
1969-1970	98.0	-	3.8
1970-1971	98.2	-	2.5
1971-1972	98.6	92.0	2.1
1972-1973	98.5	96.0	4.4
1973-1974	97.4	94.0	5.2
1974-1975	93.2	91.0	9.2
1975-1976	91.5	91.0	7.1

Source: F.M.T.V.E./C.E.P.I.

(a) Based on end-of-year enrolment figures (excluding dropouts during the year).

Table III.3: Successes in secondary school entrance examinations

		Number of candidates	Number of admissions	% of admissions	% of candidates admitted
1973	F.M.T.V.E.	1,127	687	43.0	60.0
	Other schools	2,548	894	57.0	35.0
	Total	3,675	1,581	100	-
1976	F.M.T.V.E.	2,670	1,451	58.6	54.3
	Other schools	2,985	1,026	41.4	34.4
	Total	5,675	2,477	100	-

However, in spite of these reservations, it is not going too far to conclude that F.M.T.V.E. is managing to transform a group of children from humble backgrounds and with little previous education into a highly active and academically successful segment of the population. It is also doing a great deal to promote social mobility among the group, in so far as this depends on academic success.

III.3 Other effects

F.M.T.V.E. is on a larger scale and more ambitious in its aims than any other educational television experiment currently taking place in Brazil. Apart from the system's own intrinsic merits, its development has yielded (or is in the process of yielding) many valuable results.

From the point of view of the educational process itself, what is being tried out in F.M.T.V.E. is one of the most advanced educational philosophies in the country. Of course, practice is not always a perfect reflection of theory, but even today the system in its day-to-day operation still provides a striking embodiment of totally new and unconventional conceptions of teacher-pupil relations and of the teaching-learning process. This is particularly apparent in the exceptionally high degree of participation on the part of the pupils either individually or in small groups.

From the point of view of television as such, it is too early to form a definite judgement on the quality of the broadcasts, since apart from the system's own internal criteria there are no objective yardsticks and no scientific assessment has yet been carried out. Simple, relatively unsophisticated television production techniques are known to work effectively (cf. Schramm). In the case of Maranhao, productions are generally simple, with increasing use being made of documentaries, photographs and drawings, questions and exercises to be done on the blackboard.

As regards modern educational concepts, F.M.T.V.E. has adopted behavioural objectives, self-evaluation as a means of education, criterion-based tests and a system approach to the entire learning process.

From the point of view of content relevance and creativity, no objective measurement techniques exist as yet. However, there are signs that teaching contents, especially in social subjects, had fallen considerably behind the times in recent years. This was also largely true of the mathematics and Portuguese language curricula. These shortcomings were investigated by outside specialists in the disciplines in question with a view to enabling F.M.T.V.E. to improve and modernize its curricula. When one considers the radical changes introduced into the 5th grade curriculum content in 1976 one is struck by the ability of a system of this type to adapt rapidly to change and to the progress of knowledge. The ability to introduce radical changes is characteristic of a highly centralized system, but in order to assimilate such changes rapidly an institution also needs to be dynamic. It will also be noted that this type of change does not involve any retraining of teachers.

Furthermore, the system has had a decisive influence on the creation and development of other experiments on a smaller scale, e.g. those in progress in the States of Amazonia, Ceara and Santa Catarina. For the time being it constitutes the only viable model in Brazil; it must, however, be said that it has so far failed to have any direct influence on the traditional education system in São Luis, either as regards grades 5 to 8 or at any other level. It may possibly have had a certain indirect influence through teachers learning the system - but even then there is no proof that they have introduced the F.M.T.V.E. type of educational innovation in the traditional schools in which they are now employed.

GENERAL CONCLUSION

The main purpose of this report was to provide a description of the costs of F.M.T.V.E. from its inception to a date in the foreseeable future. Analysis of the available data has shown that the average long-term cost is roughly the same as that of a medium-quality São Luis private school, i.e. about 1,400 cruzeiros. This is slightly more expensive than the traditional public system, but the situations are so different that any comparison is virtually impossible. We have shown that, because of the high fixed-cost component, marginal costs were decreasing rapidly: this is a powerful argument in favour of the extension of the system, which has in fact already been embarked upon.

F.M.T.V.E. is a highly centralized system, in which all operations are directly controlled and managed by the Centre, including - and there is probably no other project of comparable size in the world where this is the case - the transmission network. The cost of this network is essentially a fixed cost, which means that the marginal cost of utilization is almost nil. Here too, fuller utilization of the network, for example, in the evenings or during school holidays, would do a great deal to make it more economically viable, whether it was used for adult education or for commercial purposes.

Moreover, as we said in the introduction, part of these costs must be regarded as the costs of developing a prototype from which valuable lessons can be learned for use in other contexts where the system is still embryonic and qualified teachers do not exist. Such situations are to be found both in Brazil and in other countries of Latin America.

As regards the effectiveness of the system, empirical data are still too scanty to enable any definite conclusions to be drawn. Such data as are available indicate that F.M.T.V.E. has a definite advantage in terms of the proportion of pupils achieving access to higher education. Promotion rates are roughly the same as in traditional institutions, and attendance rates are remarkably high.

As regards the social effectiveness of the project, F.M.T.V.E. has provided an effective response to an unsatisfied social demand for education. It must also be emphasized that this demand emanated from a population group with no money to pay for education, namely, the inhabitants of the poorer suburbs of the capital and of the surrounding villages. Thus the project provided an educational opportunity for children to whom no alternative was available, and in doing so it increased the nation's human capital and helped to promote equality of opportunity.

In existing circumstances, it is probable that the demand for education in Maranhao can only be satisfied by extending the system to the interior of the State, in view of the acute shortage of qualified teachers. Considering its marginal cost, educational television is an economically rational response to the objective of educational promotion.

The Maranhao experiment can also be analysed from the point of view of its contribution to innovation in the educational process. There can be no doubt that F.M.T.V.E. has made innovations as regards both content and process, especially in the initial grades. We have seen how rapidly the system was able to analyse, evaluate, reformulate, rethink and implement a programme,

as in the case of the teaching of Portuguese in 1976. Another innovation, the socialization of pupils through classroom participation and the exercise of responsibility is no doubt less directly attributable to television, although these practices do seem commoner in F.M.T.V.E. schools than elsewhere. The visitor to a class is immediately struck by the constant emphasis on group dynamics and by the rôle of the teacher or "guide", which is very different from that of the teacher in a traditional school. This experience should result in a new approach to the rôle of the teacher and hence to his training - an approach that might well be adapted to other regions suffering from a shortage of specialized teachers. In this connexion we would stress that it is becoming increasingly clear that the low level of teachers' salaries, and the consequent high proportion of absenteeism among them, are one of the most urgent problems facing the F.M.T.V.E. administration. In fairness to the latter, it must however be said that the level of these salaries depends on decisions made by the State authorities and not on F.M.T.V.E. itself.

It seems reasonable and prudent to point out that the experiment has so far kept to the original model and has shown little capacity for incorporating new innovations. This diagnosis will be confirmed or refuted by the solutions adopted for the system's current phase of expansion, which poses many organizational problems. It remains to be seen whether F.M.T.V.E. will adopt ready-made solutions, based on its existing organization, or whether it will be capable of innovating in response to new problems.

In the proposed expansion zone, the pupil population has different characteristics, levels of aspiration and knowledge are not the same and the shortage of qualified teachers is more acute than in São Luis in 1969, furthermore, parental involvement in school activities is likely to be greater, especially in regions where television will be making its first appearance.

These considerations lead us to put forward a few suggestions concerning the three main priorities on which F.M.T.V.E. should concentrate in the immediate future.

The first priority is the need to improve its internal evaluation capability and its feedback capability, both from the point of view of the cost of the educational processes and from that of their results.

The second concerns the need for the most meticulous control of administrative costs. There is a natural tendency for any bureaucracy to become steadily larger and more sophisticated without any direct justification in terms of results. As administrative costs are already relatively high, it is important that their evolution should be strictly controlled; that is why we have adopted the draconian assumption of their stabilization at the present level.

Finally, F.M.T.V.E. should pay close attention to defining the rôle of the teachers, who will tend increasingly to become "professionals" different in many respects from their traditional colleagues. It is too early to tell whether or not these new functions will confer added social prestige on such a career, but the important thing is to train and motivate these teachers to exercise new and important educational functions and it is therefore essential that their rôle should be carefully defined. The definition of the teacher's precise rôle in the intelligent use of the educational media could be one of F.M.T.V.E.'s major contributions to educational innovation in situations where the context is similar to that of Maranhao - i.e. a low level of economic development, a school population drawn from an extremely humble background, and a shortage of qualified and specialized teachers.